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ABSTRACT

Validity generalization meta-analysis (VG) examines the extent to which the validity of an instrument can be transported across settings. VG offers correction and summarization procedures designed in part to remove the effects of statistical artifacts on estimates of association between criterion and predictor. By employing a random effects model, the variability of a distribution, "P," of population parameters, "p," is estimated. When the variance of this distribution is estimated to be small, validity is said to generalize across situations. It is common for an admissible validity study to contribute more than one correlation to a meta-analysis. The original VG meta-analysis (Pearlman, Schmidt, and Hunter, 1980) located 3,368 validity coefficients in 698 studies. In addition, VG is often applied to instruments used to predict success on highly complex jobs. Such measures often have positively skewed distributions of predictor and criterion scores (Hunter, 1990). This study used Monte Carlo simulation to generate situations with nonnormal distributions and dependency between effect sizes. Specifically, this effort tested the robustness of VG, as applied with the Raju et al. (1991) standard error of corrected correlations, to violations of the assumptions of independence and normality of primary data. Results of generations of 10,000 replications in 3,024 different combinations of conditions indicate that averaging correlations at the level of the primary study greatly underestimates the variance of P while skewness leads to overestimates of the variance of P. (Contains nine tables and seven figures.) (Author/SLD)

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The Robustness of the Standard Error of Summarized, Corrected Validity Coefficients to Non-Independence and Non-Normality of Primary Data

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Abstract

Validity generalization meta-analysis (VG) examines the extent to which the validity of an instrument can be transported across settings. VG offers correction and summarization procedures designed in part to remove the effects of statistical artifacts on estimates of association between criterion and predictor. By employing a random effects model, the variability of a distribution, P, of population parameters, ρ, is estimated. When the variance of this distribution is estimated to be small, validity is said to generalize across situations. It is common for an admissible validity study to contribute more than one correlation to a meta-analysis. The original VG meta-analysis (Pearlman, Schmidt, & Hunter, 1980) located 3,368 validity coefficients in 698 studies. In addition, VG is often applied to instruments used to predict success on highly complex jobs. Such measures often have positively skewed distributions of predictor and criterion scores (Hunter, 1990). This effort employed Monte Carlo simulation to generate situations with non-normal distributions and dependency between effect sizes. Specifically, this effort tested the robustness of VG, as applied with the Raju et. al. (1991) standard error of corrected correlations, to violations of the assumptions of independence and normality of primary data. Results of generations of 10,000 replications in 3,024 different combinations of conditions indicate that averaging correlations at the level of the primary study greatly underestimates the variance of P while skewness leads to overestimates of the variance of P.

The Robustness of the Standard Error of Summarized, Corrected Validity Coefficients to Non-Independence and Non-Normality of Primary Data

While recent years have seen an enormous explosion of information dissemination technology and outlets for scholarly contribution, a family of new statistical methodologies has been developing as well. Meta-analysis has arisen in response to the need for quantitative methodology to systematically summarize the findings within a given area of inquiry while providing direction to policy makers who require input from the scientific community (Hedges & Olkin, 1985).

Validity generalization meta-analysis, a specific application of meta-analytic techniques, examines the extent to which the validity of a specific instrument can be transported across settings through the use of summarized correlation coefficients. It tests situational specificity by examining the evidence for the validity of an instrument with particular attention to whether the differences in sample validity coefficients result from error variance about a single population parameter (Hunter & Schmidt, 1990, Hunter, 1990). It seeks to examine the hypothesis of situational specificity for the instrument in question by estimating three quantities from data supplied by individual studies. The mean corrected sample correlation coefficient, the mean variance due to sampling error, and the variance due to differences between studies are estimated. The mean of the corrected sample correlation coefficients is interpreted as an estimate of the magnitude of association between the instrument and actual job performance (Schmidt & Hunter, 1977). By employing a random effects model, the variability of a distribution of population parameters is estimated. In short, the average of the error variance estimates for each individual primary study is used as an estimate of the sampling variability of the average of the validity coefficients. This quantity is subtracted from the variance between validity coefficients to arrive at an estimate of the variability between underlying parameters, ρ. When the variance of this distribution is estimated to be small, validity is said to generalize across situations. Since the error variance estimates are equal to the squared standard errors, the estimation of the standard error of the individual correlations obtained from individual validity studies is central to this process. This effort focused on the robustness of these estimates to non-independent and non-normal primary data.

The field of industrial/organizational psychology has adapted as standard the concept of correcting correlations for statistical artifacts. Campbell (1990) has described validity generalization meta-analysis as an important methodology with critical implications for research and practice. He further indicates that the use of the random effects model with corrected validity coefficients has become the standard procedure in the field with the exact estimation procedures involved therein constituting the only area of remaining dispute. Resolution of the dispute will involve determinations about the relative accuracy of the competing estimation procedures as well as an examination of the extent to which the existing estimation procedures tolerate the actual data conditions of the typical validity generalization meta-analysis. The input data for a validity generalization meta-analysis, correlation coefficients obtained from primary validity studies, often do not meet the assumptions of the technique. The purpose of this effort is to extend the literature on the robustness of the standard error estimation procedures to violations of assumptions.

The methodology of validity generalization meta-analysis has become such an important issue in education and psychology because it offers techniques that adjust for statistical artifacts such as sampling error. Examples of such statistical artifacts are sampling error, the

unreliability of measurement, restriction of range, and lack of perfect construct validity. Validity generalization meta-analysis offers a set of methods, correction and summarization procedures, designed in part to remove the effects of statistical artifacts on estimates of the association between criterion and predictor. The successful application of these methods is, in theory, dependent upon the input data meeting specific statistical assumptions. A general assumption of meta-analysis as a class of procedures is independence of primary data. The concept of multiple effect sizes from a single study can be extended to validity generalization in that a single admissible validity study may contribute more than one correlation to a meta-analysis. A strict definition of the task of validity generalization limits meta-analysis to the study of statistically independent correlation coefficients (Hedges, 1989). The inclusion of a single correlation per study applies to the situation in which the meta-analysis is meant to accumulate evidence for the relationship between a specific selection measure and an accepted standard for the measurement of job performance. However, a complex job may require mastery or ability in a variety of areas, each of which is measured in a different way (Hunter, 1990). The original meta-analysis in the area of validity generalization (Pearlman, Schmidt, & Hunter, 1980) located 3,368 validity coefficients in 698 studies. Contributing to the strong presence of non-independent correlations were the common occurrences of subgroup analyses, the use of multiple predictors, and the use of multiple criteria.

Campbell (1990) has called for the field of industrial psychology to transcend reliance upon simple bivariate validity coefficients in favor of more sophisticated models of the antecedents of job performance. Doing so will require the design of studies that include multiple measures of both criterion and predictor. Such studies would contribute more than one correlation coefficient to a meta-analysis.

Measures of performance for jobs involving high complexity or sales often have positively skewed distributions. Many individuals can not perform up to a reasonable standard of success, while a few individuals exhibit extremely high levels of performance (Hunter, 1990). The correction for restriction of range assumes equal conditional variance of the criterion, that is variance of the criterion is constant across all values of the predictor (Lord and Novick, 1968). Furthermore, significance testing that employs the bivariate normal correlation model implies normality of criterion and predictor, and normal conditional probability distributions of the criterion, each with equal variance, given any value of the predictor (Neter, Wasserman, and Kutner, 1985).

This effort provides a test of the robustness of the random effects model approach to validity generalization as it is applied with the Raju, Burke, Normand, and Langlois (1991) standard error of corrected correlations to the common violations of assumptions discussed above. Monte Carlo simulation has been employed to create situations in which assumptions are violated. The design matrix includes a condition in which normally distributed primary data are used and a condition in which a skewed distribution is created through the use of a chi square distribution with 4 degrees of freedom. The number of studies contained in each meta-analysis is varied across three levels: 5, 15, and 30. The number of subjects contained in each primary study is varied across three levels: 34, 67, and 100. The intercorrelation of criterion variables is varied across four levels: .00, .25, .50, and .75. The number of effect sizes, in this case corrected validity coefficients, that each study can contribute to a meta-analysis is varied across three levels: 1, 2, and 3. The method by which an effect size is selected from each primary study for inclusion in the meta-analysis is varied across three conditions: 1) a single effect size measure is randomly selected from the available set, 2) the

effect sizes from the primary study are averaged, and 3) all effect sizes are used in the meta-analysis. The value for u, the ratio of the standard deviation of criterion scores in the restricted range case to the unrestricted standard deviation, is calculated in three ways: 1) values were taken from a standard reference table based upon the properties of the normal distribution under specific pre-set range restriction parameters (Schmidt, Hunter, Pearlman, & Shane, 1979), and 2) the ratio was calculated using two sample based strategies. All conditions were completely crossed by all other conditions except in the case of the cells that simulate primary studies containing only one effect size measure. In these cases, the effect size selection strategies are not applicable as the study can only contribute a single correlation coefficient to the meta-analysis. The matrix results in 42 different conditions occurring within each of 36 cells.

Each cell was simulated according to the simulation strategies outlined in Appendix A of Raju et al. (1991). For each primary study simulated, this process involves sampling the reliability and restriction of range parameters from predetermined distributions. The distributions were selected to represent values found in typical meta-analyses in the field of personnel psychology (Callender & Osburn, 1980). The standard error formula under investigation has been slightly modified by changing an n to an n-1 since the Raju et al. (1991) article and the revised formula was utilized (Raju, personal communication, 1994). The SAS software package was utilized to generate 10,000 replications for each cell. Three conditions of homogeneity of effect size was simulated: V(P)=.00, .01, amd .04. These values represent the variance of the distributions of population validity coefficients from which the data were sampled. The mean of each distribution was set at ρ=.5. The resulting variance of P estimates produced by employing the random effects model could then be compared to .00, .01 and .04 respectively.

The validity generalization meta-analysis procedure containing the random effects model approach and the Raju et al. (1991) standard error estimate performed very well across all conditions in which normally distributed data was simulated. This suggests that the technique is robust to non-independence of primary data when the data is sampled from normally distributed populations. This conclusion held across varying levels of intercorrelation of criterion variables and across varying calculation strategies. The skewed primary data conditions were consistently problematic as the triple correction procedure itself often overestimated ρ. This resulted in underestimates of the standard error of ρ^, and consequently overestimates of V(P). It should be noted however, that these estimates were in line with what would be expected given the overestimates of ρ, suggesting that it is the triple correction procedure that is somewhat suspect when a skewed distribution is restricted. These finding must also be subjected to future efforts in which ρ is other than .5 and in which heterogeneity of effect size is present. Implications for the practitioner include caution in applying the triple correction to sample correlation coefficients when the data are skewed. Overestimates of ρ could result in inflated estimates of the individual test validities entering meta-analysis studies. In addition, these overestimates of validity result in overestimates of V(P). These overestimates could result in the interpretation of heterogeneity of effect size, or situational specificity, when it is not warranted. However, when the multiple correlations are averaged at the level of the primary study, V(P) is greatly underestimated. This could result in the conclusion of generalizability when in fact specificity may exist.

Table 1.

Cells in the Design

rho = .5 V(P) = 0	rho = .5 V(P) = .01	rho = .5 V(P) = .04	n / study	n / meta	rho yiyj
Cell 1			34	5	0.00
Cell 2	Cell 37	Cell 55	34	5	0.25
Cell 3	Cell 38	Cell 56	34	5	0.50
Cell 4	Cell 39	Cell 57	34	5	0.75
Cell 5			34	15	0.00
Cell 6	Cell 40	Cell 58	34	15	0.25
Cell 7	Cell 41	Cell 59	34	15	0.50
Cell 8	Cell 42	Cell 60	34	15	0.75
Cell 9			34	30	0.00
Cell 10	Cell 43	Cell 61	34	30	0.25
Cell 11	Cell 44	Cell 62	34	30	0.50
Cell 12	Cell 45	Cell 63	34	30	0.75
Cell 13			67	5	0.00
Cell 14	Cell 46	Cell 64	67	5	0.25
Cell 15	Cell 47	Cell 65	67	5	0.50
Cell 16	Cell 48	Cell 66	67	5	0.75
Cell 17			67	15	0.00
Cell 18	Cell 49	Cell 67	67	15	0.25
Cell 19	Cell 50	Cell 68	67	15	0.50
Cell 20	Cell 51	Cell 69	67	15	0.75
Cell 21			67	30	0.00
Cell 22	Cell 52	Cell 70	67	30	0.25
Cell 23	Cell 53	Cell 71	67	30	0.50
Cell 24	Cell 54	Cell 72	67	30	0.75
Cell 25			100	5	0.00
Cell 26			100	5	0.25
Cell 27			100	5	0.50
Cell 28			100	5	0.75
Cell 29			100	15	0.00
Cell 30			100	15	0.25
Cell 31			100	15	0.50
Cell 32			100	15	0.75
Cell 33			100	30	0.00
Cell 34			100	30	0.25
Cell 35			100	30	0.50
Cell 36			100	30	0.75

Table 2.
Conditions Within Each Cell

Condition	u	es selection method	nes	distribution
1	1	na	1	normal
2	1	1	2	normal
3	1	2	2	normal
4	1	3	2	normal
5	1	1	3	normal
6	1	2	3	normal
7	1	3	3	normal
8	1	na	1	chi square
9	1	1	2	chi square
10	1	2	2	chi square
11	1	3	2	chi square
12	1	1	3	chi square
13	1	2	3	chi square
14	1	3	3	chi square
15	2	na	1	normal
16	2	1	2	normal
17	2	2	2	normal
18	2	3	2	normal
19	2	1	3	normal
20	2	2	3	normal
21	2	3	3	normal
22	2	na	1	chi square
23	2	1	2	chi square
24	2	2	2	chi square
25	2	3	2	chi square
26	2	1	3	chi square
27	2	2	3	chi square
28	2	3	3	chi square
29	3	na	1	normal
30	3	1	2	normal
31	3	2	2	normal
32	3	3	2	normal
33	3	1	3	normal
34	3	2	3	normal
35	3	3	3	normal
36	3	na	1	chi square
37	3	1	2	chi square
38	3	2	2	chi square
39	3	3	2	chi square
40	3	1	3	chi square
41	3	2	3	chi square
42	3	3	3	chi square

u1 = pop./pop., u2 = sample/pop., u3 = sample/sample.
es method 1 = randomly pick, 2 = average, 3 = use all.
nes = number of effect sizes.

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Table 3
Distribution of Situation Mean V(P) Estimates
By Effect Size Selection Method and V(P) Condition.

	Combination of Effect Size Selection Method and V(P) Condition								
Quartiles	pick/.00	pick/.01	pick/.04	avg/.00	avg/.01	avg/.04	all/.00	all/.01	all/.04
Min	-0.000580	0.006724	0.036267	-0.079248	-0.056591	-0.025853	-0.006450	0.001964	0.025752
25th	0.001889	0.011381	0.039007	-0.024871	-0.019580	0.009104	0.001526	0.010210	0.035139
50th	0.006743	0.014689	0.040231	-0.012318	-0.003693	0.022664	0.005299	0.013517	0.038317
75th	0.009059	0.022958	0.048994	-0.001525	0.009845	0.034146	0.008874	0.021148	0.045747
Max	0.015230	0.028349	0.055974	0.005825	0.030018	0.049192	0.015066	0.027535	0.054983
Mean	0.006028	0.016987	0.043409	-0.016545	-0.006880	0.019796	0.005464	0.015246	0.039964
S.D.	0.004132	0.005969	0.006191	0.018592	0.019295	0.017814	0.004312	0.006270	0.006816
No. of Situations	432	216	216	432	216	216	432	216	216
Max error as % of:									
V(P), .01 or .04		183.49%	39.94%		865.91%	164.63%		175.35%	37.46%
V(P),q= 5,"large"	46.56%	56.10%	46.84%	242.30%	203.60%	201.34%	46.06%	53.61%	45.81%

Each Situation consists of a condition occurring within a cell and represents the mean of 10,000 replications. Only those conditions with 2 or 3 effect sizes per primary study are included.

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Means for V(P) Estimates

By Effect Size Selection Method & V(P)

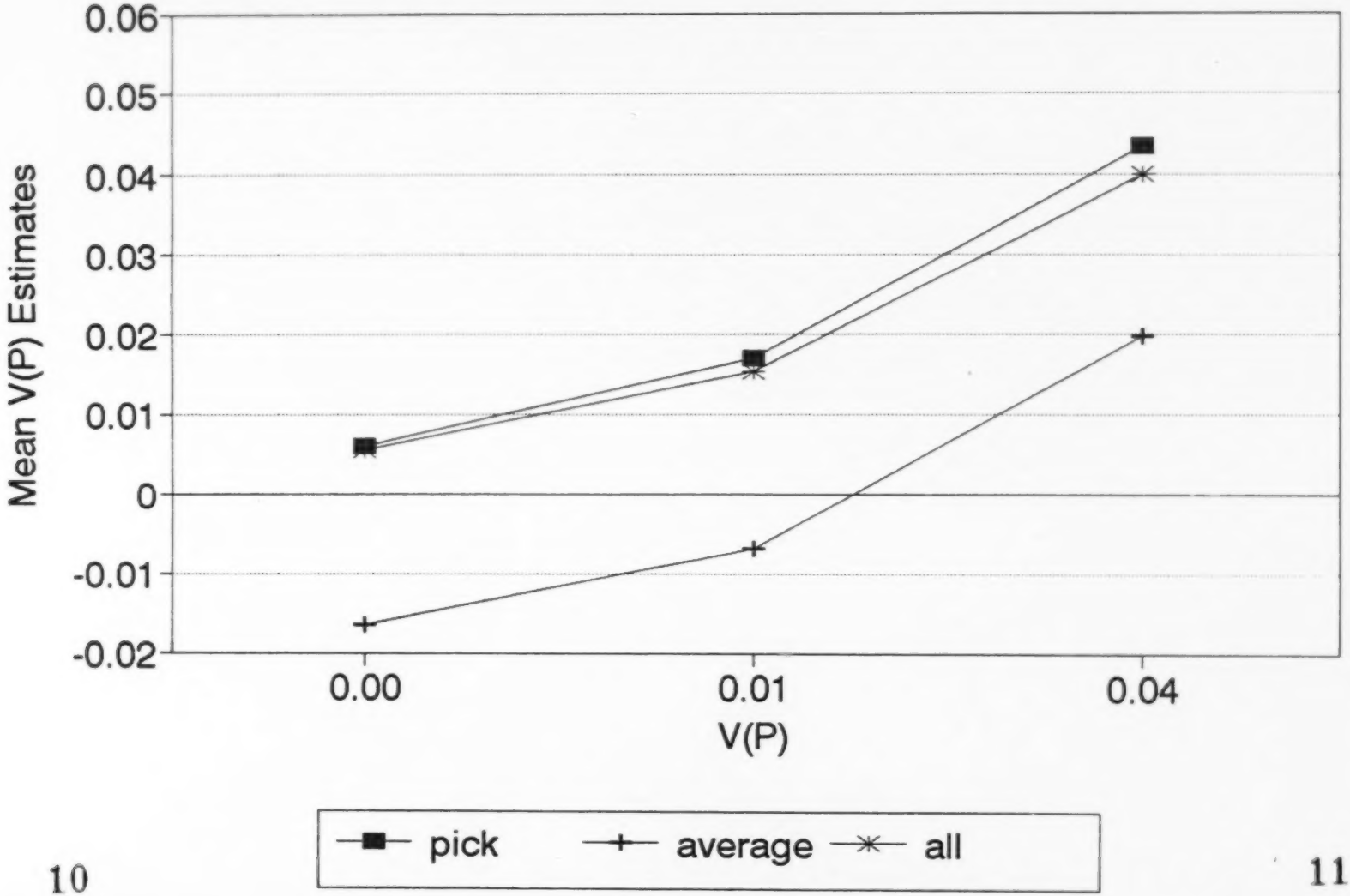

Table 4

Distribution of Situation Mean V(P) Estimates
By Distribution Type and V(P) Condition.

	Combination of Distribution Type and V(P) Condition					
Quartiles	norm-.00	norm-.01	norm-.04	chisq-.00	chisq-.01	chisq-.04
Min	-0.005521	0.002903	0.026359	0.008497	0.020093	0.041309
25th	0.001435	0.010441	0.037062	0.010969	0.025228	0.049914
50th	0.001744	0.010911	0.038450	0.011810	0.026034	0.053588
75th	0.002012	0.011391	0.039304	0.013258	0.026600	0.055687
Max	0.004427	0.012214	0.040285	0.015230	0.028349	0.066166
Mean	0.001613	0.010523	0.037646	0.012111	0.025785	0.054301
S.D.	0.001038	0.001597	0.002597	0.001545	0.001591	0.006399
No. of Situations	180	90	90	180	90	90
Max error as % of:						
V(P), .01 or .04		70.97%	34.10%		183.49%	65.42%
V(P),q=.3,"medium"	44.78%	57.56%	110.64%	123.53%	148.83%	212.23%

Each Situation consists of a condition occurring within a cell and represents the mean of 10,000 replications. Only u3 conditions where non-averaging effect size selection methods were used are included.

Means for V(P) Estimates

By Distribution Type and V(P)

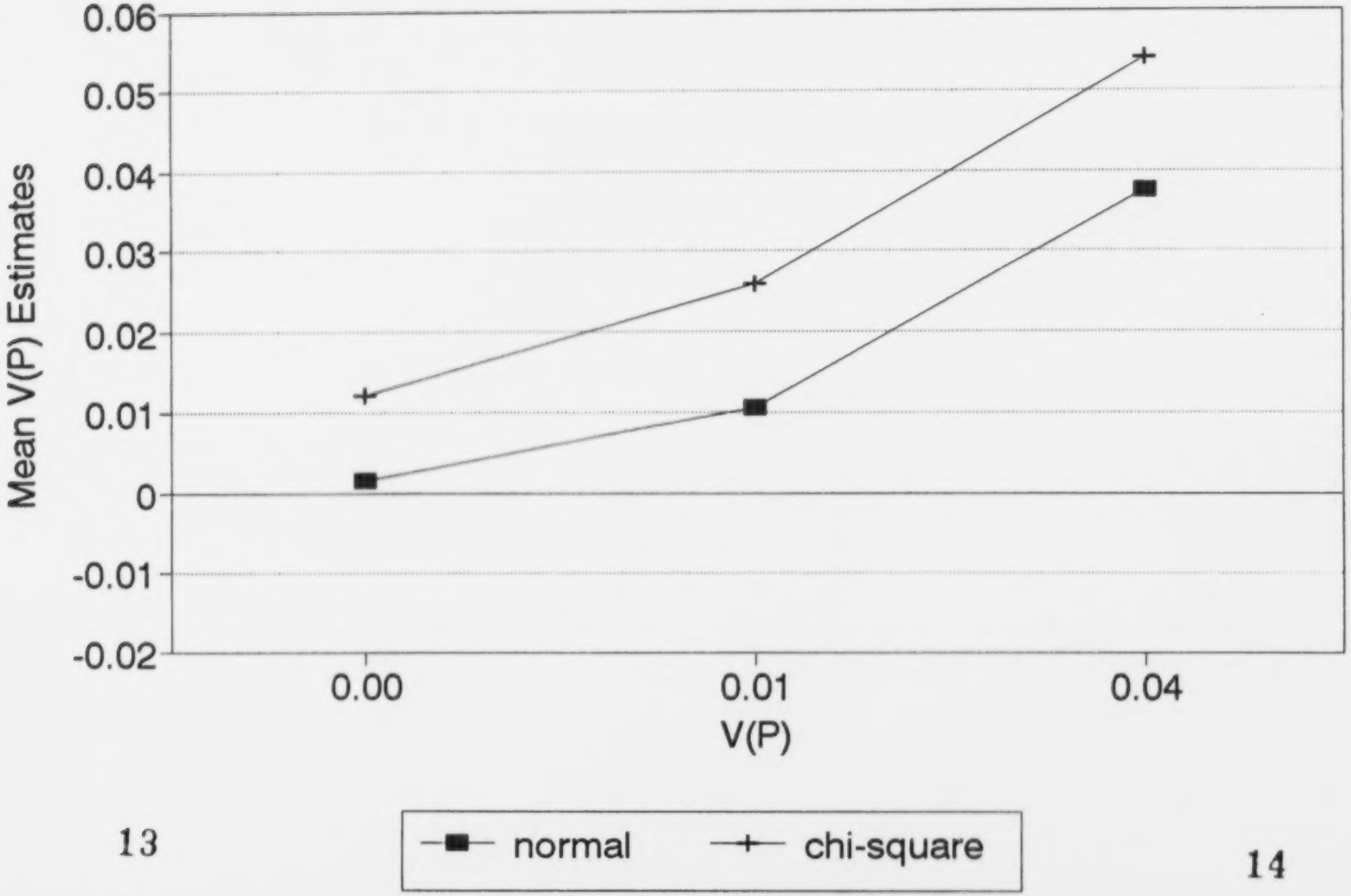

Table 5
Distribution of Situation Mean V(P) Estimates
By u Calculation Method and V(P) Condition

	Combination of u Calculation Method and V(P) Condition								
Quantiles	u1/.00	u1/.01	u1/.04	u2/.00	u2/.01	u2/.04	u3/.00	u3/.01	u3/.04
Min	-0.002552	0.005858	0.028623	-0.006450	0.001984	0.025752	-0.005521	0.002903	0.026358
25th	0.002804	0.011785	0.038350	0.000734	0.009263	0.036087	0.001366	0.010158	0.036782
50th	0.003049	0.012582	0.039671	0.001142	0.010089	0.037886	0.001699	0.010839	0.038188
75th	0.004375	0.013858	0.040473	0.001431	0.010895	0.038745	0.001981	0.011314	0.039230
Max	0.007151	0.014588	0.041618	0.003483	0.011703	0.040470	0.004427	0.012214	0.040285
Mean	0.003351	0.012394	0.038794	0.000928	0.009622	0.036883	0.001584	0.010343	0.037316
S.D.	0.001420	0.001788	0.002729	0.001181	0.001788	0.002838	0.001121	0.001725	0.002784
No. of Situations	144	72	72	144	72	72	144	72	72
Max error as % of:									
V(P). .01 or .04		46.89%	28.44%		60.36%	35.82%		70.97%	34.10%
V(P).q=.3,"medium"	58.00%	38.03%	92.28%	52.32%	65.18%	115.56%	44.78%	57.56%	110.84%

Each Situation consists of a condition occuring within a cell and represents the mean of 10,000 replications. Only normally distributed conditions where non-averaging effect size selection methods were used are included.

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Means for V(P) Estimates

By u Calculation Method and V(P)

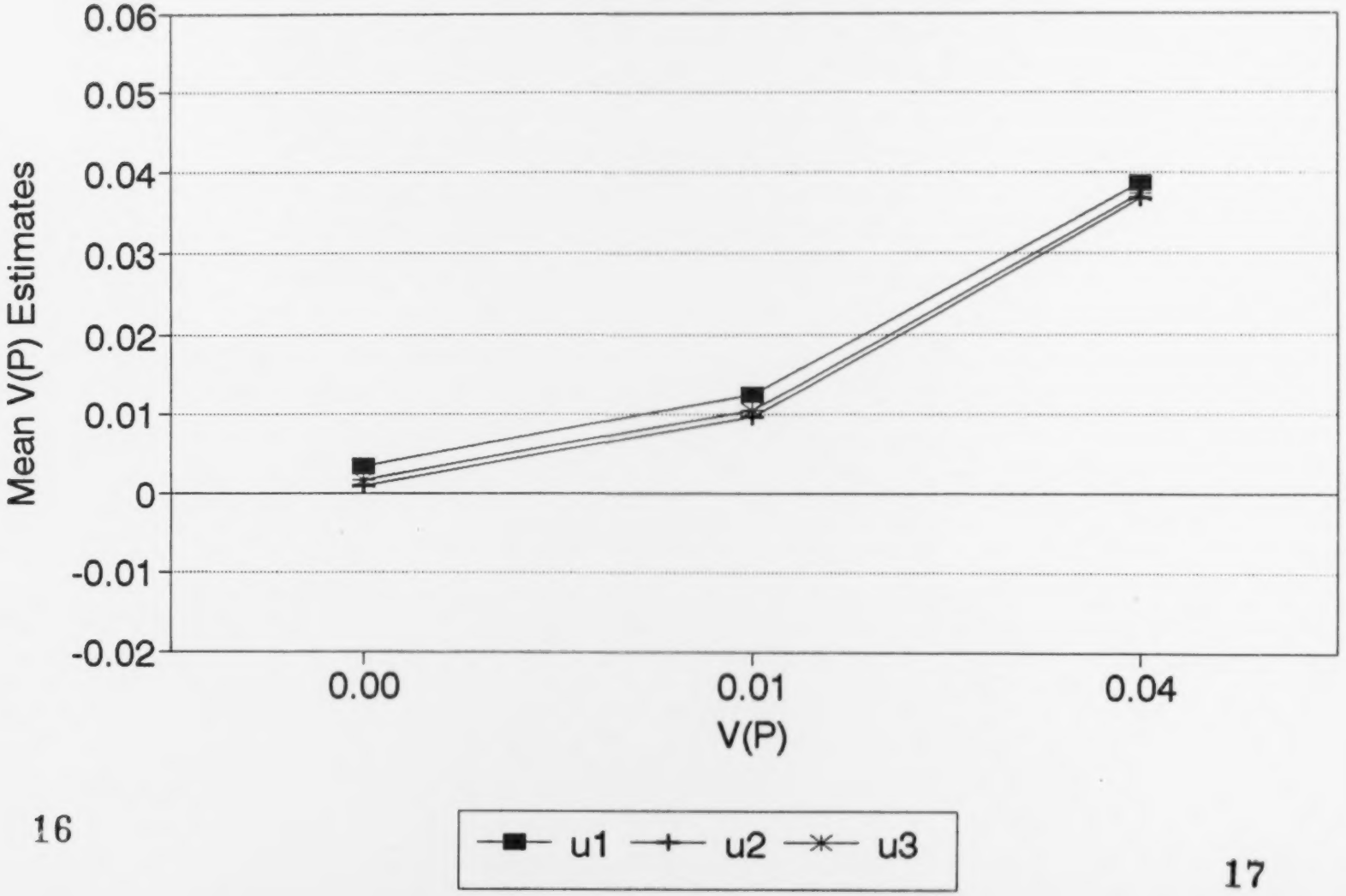

Table 6

Distribution of Situation Mean V(P) Estimates

By Intercorrelation of Criterion Variables and V(P) Condition.

	Combination of Intercorrelation of Criterion Variables and V(P) Condition									
Quartiles	.00/.00	.25/.00	.25/.01	.25/.04	.50/.00	.50/.01	.50/.04	.75/.00	.75/.01	.75/.04
Min	0.000459	0.000821	0.008542	0.032612	-0.001381	0.005789	0.030813	-0.005321	0.002903	0.028358
25th	0.001853	0.001468	0.010611	0.037418	0.001366	0.010276	0.036926	0.000999	0.010148	0.036832
50th	0.001974	0.001673	0.011119	0.038588	0.001589	0.011009	0.038431	0.001482	0.010792	0.038089
75th	0.002256	0.001884	0.011404	0.039188	0.001935	0.011279	0.039370	0.001835	0.011178	0.038211
Max	0.004427	0.003101	0.012214	0.040106	0.003231	0.012078	0.040285	0.002730	0.011843	0.040231
Mean	0.002133	0.001707	0.010980	0.038002	0.001577	0.010499	0.037710	0.001035	0.010068	0.037227
S.D.	0.000649	0.000422	0.000771	0.001895	0.000812	0.001430	0.002404	0.001581	0.002185	0.003319
No. of Situations	45	45	30	30	45	30	30	45	30	30
Max error as % of:										
V(P), .01 or .04			22.14%	18.47%		42.11%	22.97%		70.97%	34.10%
V(P),q=.3,"medium"	35.91%	25.15%	17.96%	59.92%	28.21%	34.16%	74.52%	44.78%	57.56%	110.84%

Each Situation consists of a condition occurring within a cell and represents the mean of 10,000 replications. Only normally distributed, u3 conditions where non-averaging effect size selection methods were used are included.

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Means for V(P) Estimates

By Intercorrelatn of Crit.Vars. & V(P)

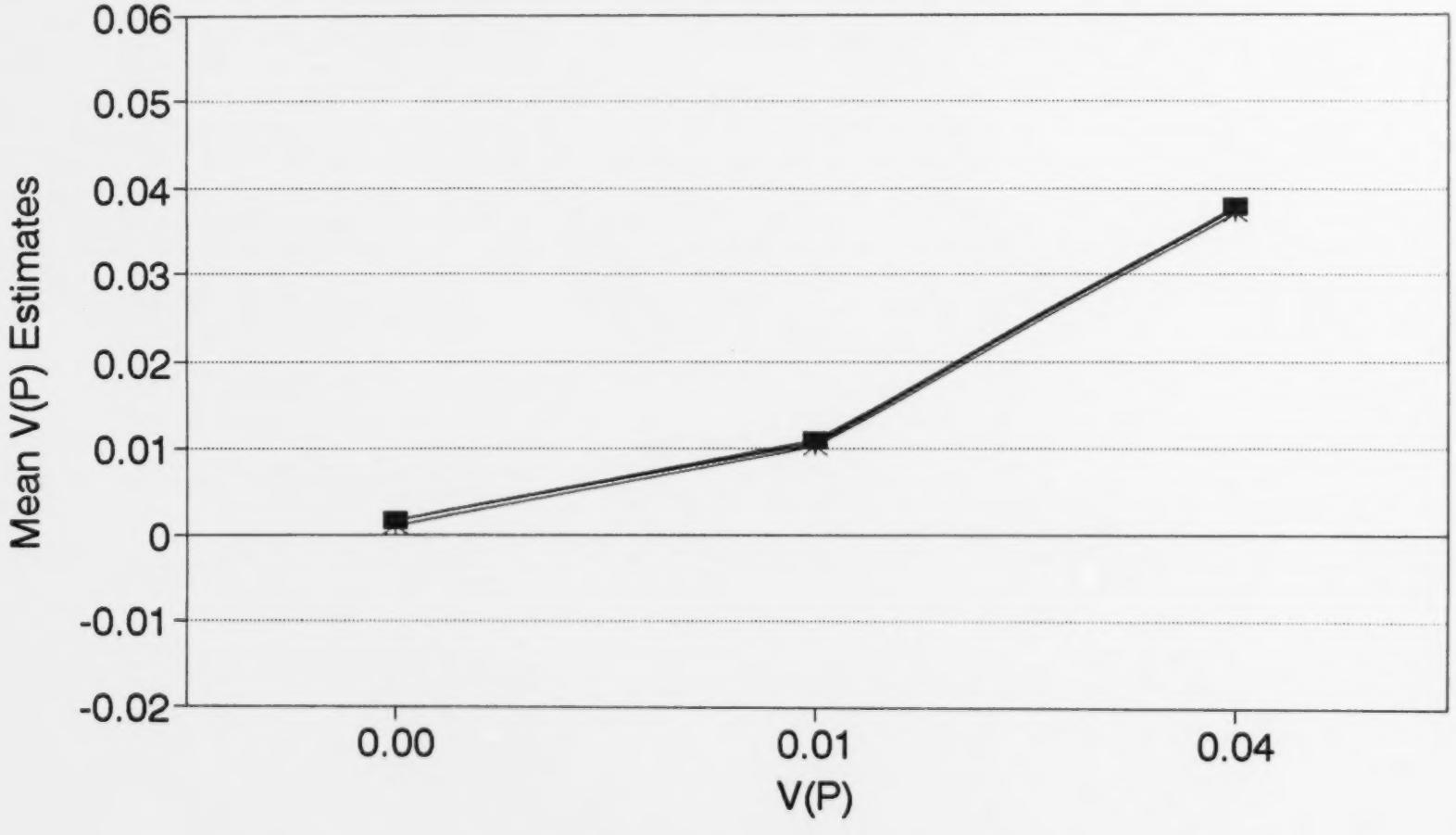

Table 7

Distribution of Situation Mean V(P) Estimates

By Sample Size of Primary Study and V(P) Condition.

	Combination of Sample Size of Primary Study and V(P) Condition						
Quartiles	34/.00	34/.01	34/.04	67/.00	67/.01	67/.04	100/.00
Min	-0.005521	0.002903	0.026359	-0.001446	0.005851	0.031443	-0.000365
25th	0.001077	0.010276	0.036795	0.001367	0.010630	0.037650	0.001482
50th	0.001839	0.010746	0.038026	0.001693	0.011142	0.039211	0.001706
75th	0.002281	0.011179	0.038586	0.001981	0.011472	0.039513	0.001891
Max	0.004427	0.012214	0.039606	0.003355	0.012076	0.040285	0.002290
Mean	0.001554	0.010235	0.037044	0.001644	0.010811	0.038249	0.001641
S.D.	0.001570	0.001889	0.002836	0.000774	0.001192	0.002204	0.000449
No. of Situations	60	45	45	60	45	45	60
Max error as % of:							
V(P), .01 or .04		70.97%	34.10%		41.49%	21.39%	
V(P),q=.3,"medium"	44.78%	57.56%	110.64%	27.21%	33.65%	69.41%	18.57%

Each Situation consists of a condition occurring within a cell and represents the mean of 10,000 replications. Only normally distributed, u3 conditions where non-averaging effect size selection methods were used are included.

Means for V(P) Estimates

By Sample Size of Primary Study & V(P)

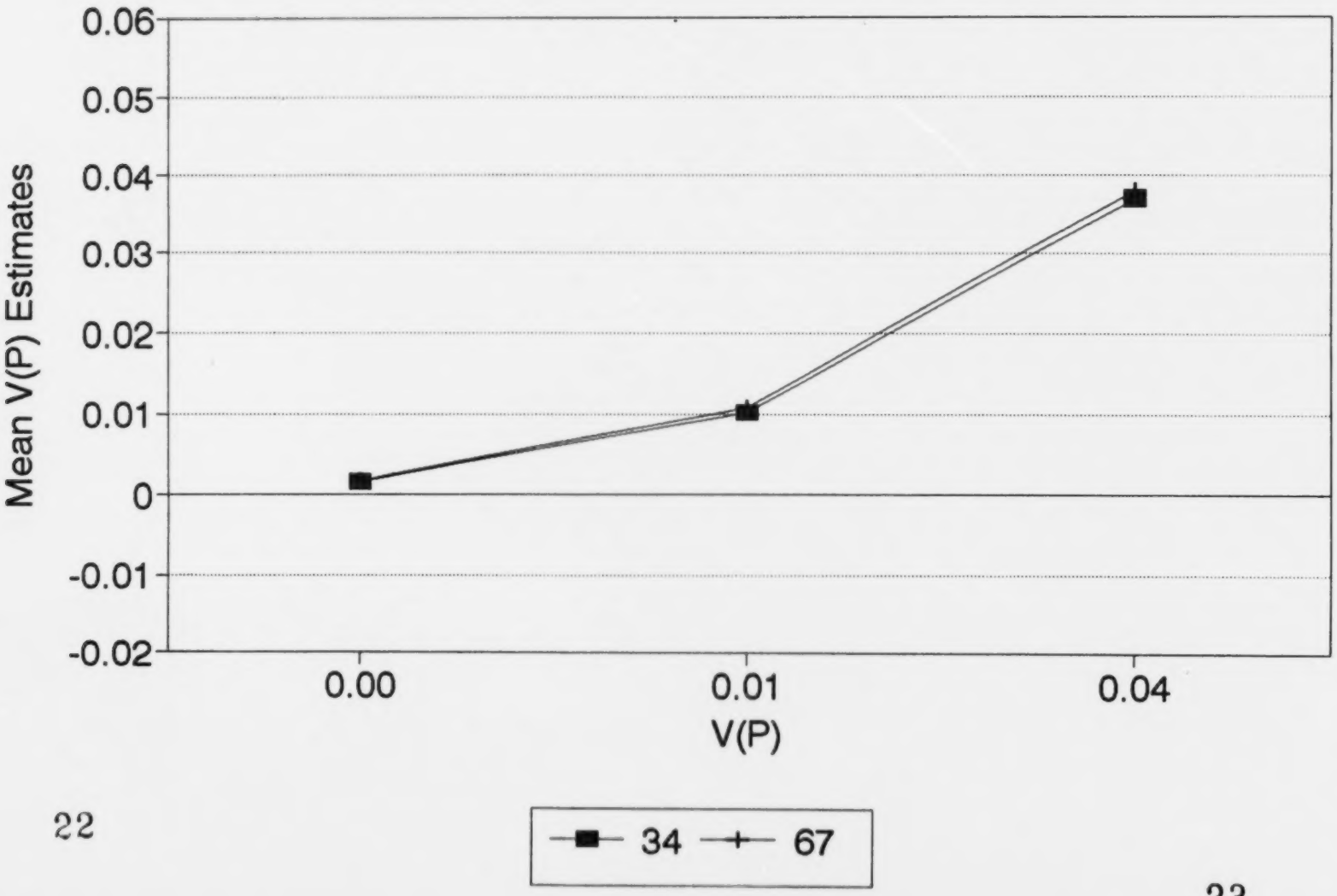

Table 8
Distribution of Situation Mean V(P) Estimates
By Sample Size per Meta-Analysis and V(P) Condition.

	Combination of Sample Size per Primary Study and V(P) Condition								
Quartiles	5/.00	5/.01	5/.04	15/.00	15/.01	15/.04	30/.00	30/.01	30/.04
Min	-0.005521	0.002903	0.026359	0.000128	0.008621	0.034769	0.001101	0.010149	0.036813
25th	0.000963	0.008542	0.033356	0.001463	0.010441	0.037418	0.001844	0.010911	0.038022
50th	0.001616	0.010611	0.036329	0.001658	0.010697	0.038771	0.001801	0.011157	0.038203
75th	0.002178	0.011179	0.039238	0.001946	0.011345	0.039246	0.001997	0.011452	0.039325
Max	0.004427	0.012214	0.040265	0.003101	0.011960	0.040106	0.002912	0.011943	0.039854
Mean	0.001329	0.009659	0.036269	0.001670	0.010715	0.038241	0.001841	0.011194	0.038409
S.D.	0.001649	0.002402	0.003893	0.000551	0.000777	0.001320	0.000332	0.000418	0.000964
No. of Situations	60	30	30	60	30	30	60	30	30
Max error as % of:									
V(P), .01 or .04		70.97%	34.10%		19.60%	13.08%		19.43%	8.47%
V(P),q= 3,"medium"	44.78%	57.56%	110.64%	25.15%	15.90%	42.43%	23.62%	15.76%	27.47%

Each Situation consists of a condition occurring within a cell and represents the mean of 10,000 replications. Only normally distributed, u3 conditions where non-averaging effect size selection methods were used are included.

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Means for V(P) Estimates

By Sample Size per Meta-Analysis & V(P)

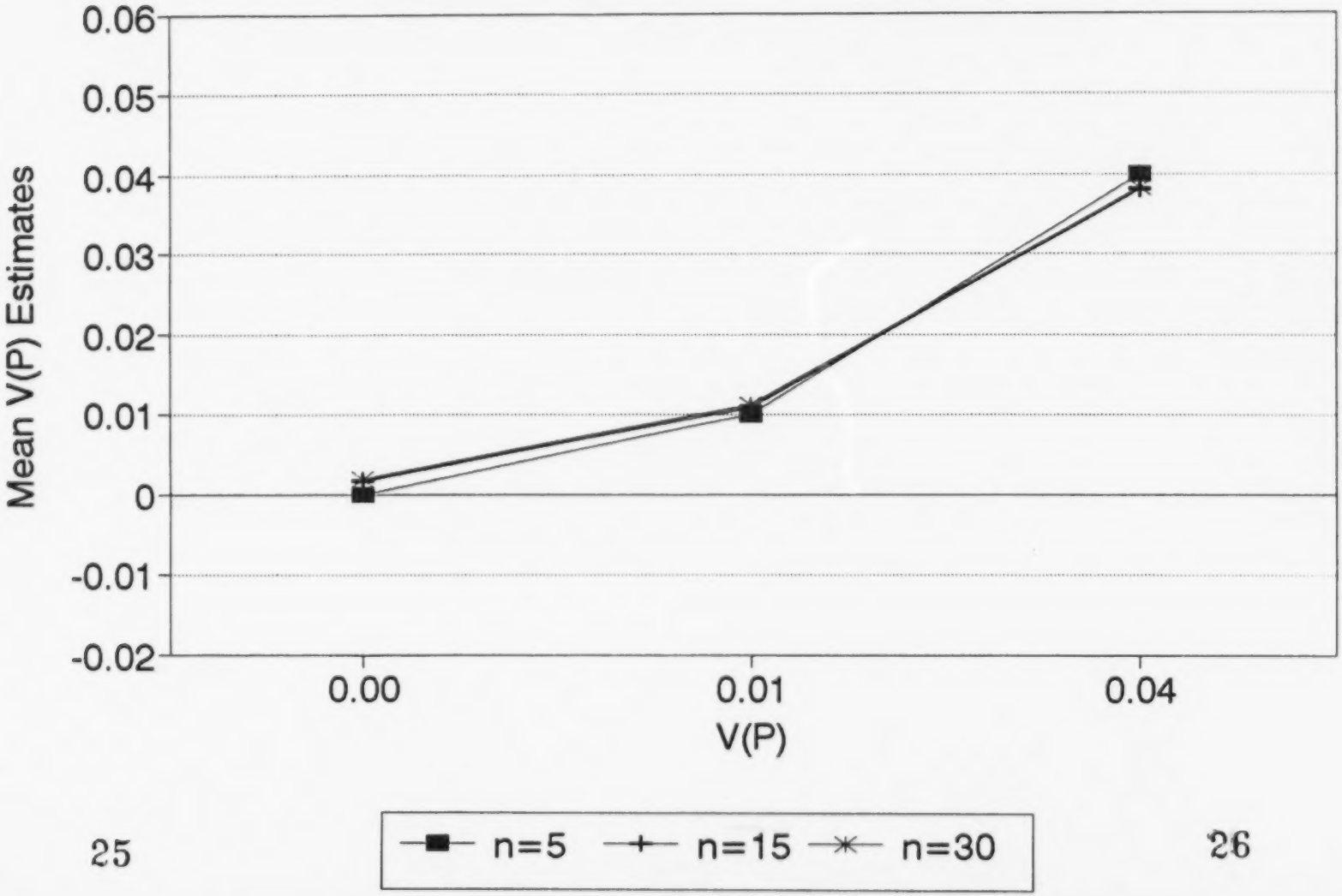

Table 9
Distribution of Situation Mean V(P) Estimates
By Effect Sizes per Primary Study and V(P) Condition

	Combination of Effect Sizes per Primary Study and V(P) Condition								
Quartiles	1/.00	1/.01	1/.04	2/.00	2/.01	2/.04	3/.00	3/.01	3/.04
Min	-0.000701	0.010276	0.037547	-0.004527	0.004570	0.028458	-0.005521	0.002903	0.026359
25th	0.001571	0.010911	0.038147	0.001384	0.010360	0.036913	0.001296	0.009939	0.036613
50th	0.001826	0.011279	0.039106	0.001695	0.011018	0.038156	0.001742	0.010644	0.038188
75th	0.002056	0.011472	0.039541	0.002012	0.011381	0.039236	0.001969	0.011179	0.039211
Max	0.002788	0.012062	0.040151	0.003680	0.012214	0.040231	0.004427	0.012076	0.040285
Mean	0.001329	0.009659	0.036289	0.001670	0.010715	0.038241	0.001841	0.011194	0.038409
S.D.	0.001649	0.002402	0.003893	0.000551	0.000777	0.001320	0.000332	0.000418	0.000964
No. of Situations	36	18	18	72	36	36	72	36	36
Max error as % of:									
V(P), .01 or .04		20.62%	6.13%		54.30%	26.86%		70.97%	34.10%
V(P),q = .3,"medium"	22.60%	16.72%	19.90%	36.72%	44.04%	93.62%	44.78%	57.56%	110.64%

Each Situation consists of a condition occuring within a cell and represents the mean of 10,000 replications. Only normally distributed, u3 conditions where non-averaging effect size selection methods were used are included.

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Means for V(P) Estimates

By Effect Sizes / Primary Study & V(P)